

REMARKS

Upon entry of this amendment, claims 1-17 are pending. Claims 18-20 have been canceled and no new claims have been added. Support for the amendment to claim 1 can be found, for example, at page 7, lines 13-20 of the specification.

Reconsideration is requested of the rejection of claims 2 and 3 under 35 U.S.C §112, second paragraph. Claim 2 was amended to specify that the deposition of the epitaxial layer occurs prior to the heating step recited in claim 1. Claim 3 was amended to correct the dependency.

Reconsideration is requested of the rejection of claims 1-15 and 18-20 as being unpatentable over Falster (PCT 38675) et al. or Huber et al., both in view of Goodwin et al. (U.S. Patent No. 5,324,155).¹

Claim 1 is directed to a process in which, among other things, the wafer is heated to a temperature of at least about 1175°C with a heat source, said semiconductor being supported by a support in the housing during said heating; ceasing said heating and moving said semiconductor out of conductive heat transfer relation with the support with a Bernoulli wand; and **cooling said heated wafer in the housing while holding said wafer out of conductive heat transfer relationship with the support at a rate of at least 10°C/sec until the wafer reaches a temperature of less than about 850°C.**

While Falster and Huber et al. disclose heating wafers to temperatures of at least 1175 °C and even rapidly cooling them, neither discloses supporting the wafer on a support during the heating step and removing the wafer from the support with a Bernoulli wand or any other device as the wafer cools from the heating temperature to a temperature of no more than 850°C.

Goodwin et al. disclose an epitaxial deposition chamber and process which employ a Bernoulli wand, but Goodwin et al. disclose that the wafer should not be lifted from its support with the Bernoulli wand until after the wafer has first cooled to a temperature in the range of 800-900 °C:

Normal processing in the reaction chamber raises the wafer temperature to approximately 1150 °C. The temperature cools down to below 1000 °C in about one minute. A very short time later, **when the wafer**

¹The rejection of claims 18-20 has been rendered moot by the cancellation of these claims. Applicants expressly reserve the right to pursue the subject matter of these claims in their full scope in a continuation application; these claims were canceled for the purpose of expediting examination of this application.

temperature is lowered to 800 °C - 900 °C, the pick up wand assembly can lift the hot wafer without damage thereto.²

This express teaching is contrary to the requirements of claim 1 which requires that the wafer be cooled to a temperature not less than 850 °C while the wafer is being held by the wand and out of heat conductive transfer with the support.

When considered in combination, therefore, Falster et al., Huber and Goodwin et al. would lead a person of ordinary skill away from and not to the claimed invention. Goodwin et al. suggest that the wafer will be damaged if it is lifted using the wand before it cools to a temperature of 800 - 900 °C; a person of ordinary skill looking to improve upon the Falster et al. or Huber processes, therefore, would not have been led to the invention defined by claim 1.

Claims 2-14 depend from claim 1 and are patentable over the cited references for the same reasons claim 1 is distinguishable.

Reconsideration is requested of the rejection of claims 16 and 17 as being unpatentable over Falster (PCT 38675) et al. or Huber et al., both in view of Goodwin et al. (U.S. Patent No. 5,324,155).

Claims 16 and 17 depend from claim 1 and, for the reasons previously stated, claim 1 is patentable over the three cited references. It necessarily follows, therefore, that claims 16 and 17 which added requirements to claim 1 are patentable over these three references for the same reasons claim 1 is patentable over the cited references.

²Goodwin et al., U.S. Patent No. 5,324,155 at column 16, lines 33-38, emphasis added.

VERSION WITH MARKINGS SHOWING CHANGES MADE

IN THE CLAIMS:

Claim 1 was amended as follows:

1. (amended) A method of producing a denuded zone in a semiconductor wafer in a housing having a source of heat, a susceptor, a wafer support and a Bernoulli wand, said method including:

5 heating a semiconductor wafer with opposite major surfaces in a housing to an elevated temperature of at least about 1175°C with a heat source, said semiconductor being supported by a support in the housing during said heating;

ceasing said heating and moving said semiconductor out of conductive heat transfer relation with the support with the Bernoulli wand; and

10 cooling said heated wafer in the housing while holding said wafer out of conductive heat transfer relationship with the support at a rate of at least 10°C/sec until the wafer reaches a temperature of less than about 850°C thereby forming a **template for oxygen precipitation in the wafer [denuded zone]**.

Claim 2 was amended as follows:

2. (amended) A method as set forth in claim 1 **wherein the process additionally comprises the step of [including]** placing the wafer in a chamber and applying an epitaxial coating to at least one said major surface thereof **before said heating step** with said wafer being in immediate heat transfer relation with the support
5 during at least a portion of the coating application[;].

Claim 3 was amended as follows:

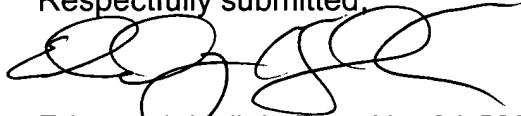
3. (amended) A method as set forth in claim **2 [3]** wherein said wafer is heated to a temperature of at least about 1250°C after said coating is applied and the cooling rate of the wafer is at least about 20°C/sec.

Claims 18-20 were canceled.

CONCLUSION

A check in the amount of \$400.00 for a two month extension of time is enclosed. The Commissioner is hereby authorized to charge any additional fees which may be required to Account No. 19-1345.

Respectfully submitted,



Edward J. Hejlek, Reg. No. 31,525
SENNIGER, POWERS, LEAVITT & ROEDEL
One Metropolitan Square, 16th Floor
St. Louis, Missouri 63102
(314) 231-5400